MULTIMEDIA UNIVERSITY

STUDENT ID NO | | | | | | | | | | |

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 2, 2016/2017

DCS5028 – DISCRETE STRUCTURES

(All sections / Groups)

2 MARCH 2017
9.00 a.m. – 11.00 a.m.
(2 Hours)

INSTRUCTIONS TO STUDENT

1. This question paper consists of **4 pages**. Please attempt **ALL** questions.

2. Please write your answers in the **Answer Booklet** provided.

SECTION A: FOUR STRUCTURED QUESTIONS (TOTAL: 100 Marks)
Answer all questions and show necessary workings in the answer booklet provided.

QUESTION 1 (25 Marks)

A. A class of 72 students completed a survey on what hobbies they like. The choices are online games, reading and play football.

15 students liked to play online games and football.

3 students liked reading and play online games.

12 students liked reading and football

5 students liked to play football, reading and online game

All together 28 students liked to play online games, 25 liked reading books and 38 students like to play football.

Determine:

I. Draw Venn Diagram for question above. [3 Marks]
II. How many students didn't like all these hobbies? [2 Marks]
III. How many students liked to play online games but neither reading nor play football? [2 Marks]

B. Given $X = (x|0<x<6)$ and $Y = (y|0<y<10)$, where f is the function of $2x-1$.

I. Draw its diagram and find domain and co-domain. [6 Marks]
II. List all the range of function. [1 Marks]
III. Determine if it's injective, surjective and bijective. [1 Marks]

C. By using the Euclidean Algorithm, find:

I. The Greatest Common Divisor (GCD) for the numbers of 543 and 3106. [3 Marks]
II. The value of s and t satisfying that $543s + 3106t = \text{GCD}(543,3106)$. [5 Marks]
III. The Least Common Multiple (543,3106). [2 Marks]

Continued...

QUESTION 2 (25 marks)

A. Find the number of different ways the letters of the word "**ANNIVERSARY**" can be arranged. [2 Marks]

B. How many strings of **FIVE** English letters are there;
   I. that contains no vowels, if letters can be repeated? [3 Marks]
   II. that contains no vowels, if letters cannot be repeated? [3 Marks]
   III. that starts with a vowel, if letters can be repeated? [3 Marks]
   IV. that starts with a vowel, if letters cannot be repeated? [3 Marks]

C. Out of 7 consonants and 4 vowels, how many words of 3 consonants and 2 vowels can be formed? [7 Marks]

D. There are 18 types of chocolate and 325 types of biscuits at a mall.
   I. How many ways are there to pick two items, so that one is a chocolate and the other is a biscuit? [2 Marks]
   II. How many ways are there to pick one item which is either a chocolate or a biscuit? [2 Marks]

QUESTION 3 (25 marks)

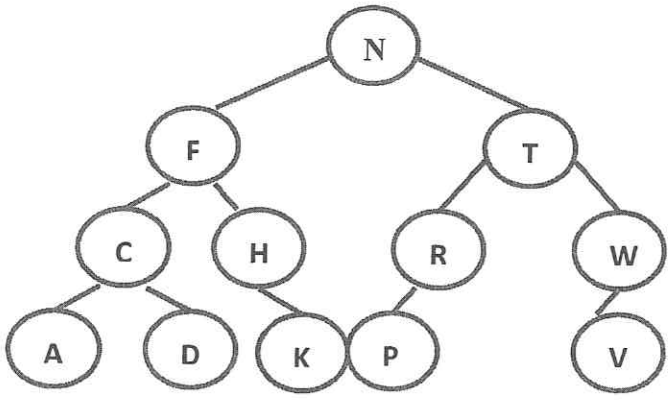
A. Given an Incidence matrix

	e1	e2	e3	e4	e5	e6	e7	e8
1	0	0	1	0	1	0	0	1
2	1	0	0	0	0	1	1	0
3	1	1	0	1	1	0	0	0
4	0	1	1	0	0	0	0	0
5	0	0	0	1	0	1	0	0
6	0	0	0	0	0	0	1	1

   I. Draw the graph according to the given Incidence matrix. [6 Marks]
   II. Determine if the graph contains Euler Cycle and Hamiltonian Cycle. If it exists, indicate the route. [4 Marks]
   III. Determine whether the graph is planar or not. If yes, draw a graph to show that no edges cross each other. [5 Marks]

Continued...

B. Given a tree diagram below.



I. Search the node **K** using Breath Search method. [2 Marks]

II. Refer to the binary tree diagram given.

a. Find the ancestors of **V.** [2 Marks]
b. Find the descendants of **F.** [2 Marks]
c. Find the **leaf vertices.** [2 Marks]
d. Find the **internal vertices.** [2 Marks]

QUESTION 4 (25 marks)

A. Construct circuits that produce the following outputs:

I. $xy' \oplus (ay \vee b)'$ [4 Marks]

II. $(b' \oplus c) \wedge (a'cb \vee xy)'$ [5 Marks]

B. Draw the Karnaugh Map for the optimal Boolean expression below and write the minimized expression.

I. $mn't \vee mnkt \vee m'n'k't \vee tm' \vee k'n't' \vee m'k' \vee k't$ [4 Marks]

II. $gh'tp \vee ht' \vee g'p'h't \vee g'ht \vee pt'h$ [4 Marks]

Continued...

C. Given a finite state machine table A and the initial state is at S_3. Draw the transition diagram of the finite state machine using data from the state table A.

[8 Marks]

	f			*g*		
	T	K	Y	T	K	Y
S_0	S_0	S_4	S_2	1	1	0
S_1	S_4	S_3	S_2	0	1	0
S_2	S_0	S_1	S_4	1	1	0
S_3	S_1	S_3	S_0	0	0	1
S_4	S_2	S_0	S_3	0	0	1

Table A

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